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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Hideya TAKEO

Appln. No.: 09/356,505

Confirmation No.: 7922

Filed: July 19, 1999

Docket No: Q55129

Group Art Unit: 2623

Examiner: Anand P. BHATNAGAR

For: METHOD, APPARATUS AND RECORDING MEDIUM FOR DATA COMPRESSION

SUBMISSION OF APPELLANT'S BRIEF ON APPEAL

Commissioner for Patents
Washington, D.C. 20231

Sir:

Submitted herewith please find an original and two copies of Appellant's Brief on Appeal. A check for the statutory fee of $320.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

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Michael J. Whitehead
Registration No. 48,071

Date: May 22, 2003

#13

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For: METHOD, APPARATUS AND RECORDING MEDIUM FOR DATA COMPRESSION

APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

Commissioner for Patents
Washington, D.C. 20231

Sir:

In accordance with the provisions of 37 C.F.R. § 1.192, Appellant submits the following Brief, requesting that the Board reverse the rejection of claims 1-30:

I. REAL PARTY IN INTEREST

The real party in interest is Fuji Photo Film Co., Ltd. by virtue of an assignment executed by Hideya TAKEO (Appellant, hereafter), on July 13, 1999, respectively, and recorded by the Assignment Branch of the U.S. Patent and Trademark Office on July 19, 1999 (at Reel 010117, Frame 0504).

II. RELATED APPEALS AND INTERFERENCES

To the knowledge and belief of Appellant, the Assignee, and the undersigned, there are no other appeals or interferences before the Board of Appeals and Interferences that will directly affect or be affected by the Board's decision in the instant Appeal.

III. STATUS OF CLAIMS

Claims 1-30 are pending in the application, and stand finally rejected. The rejections of claims 1-30 are being appealed.

IV. STATUS OF AMENDMENTS

In response to the final Office Action (Paper No. 7) in which claims 1-30 were finally rejected, Appellant filed an Amendment under 37 C.F.R. § 1.116 on March 4, 2003, amending claims 9, 26 and 27. The Examiner issued an Advisory Action on March 24, 2003. It is believed that the amendments have been entered, based on Item 3 of the Advisory Action.

V. SUMMARY OF THE INVENTION

The present invention relates to data compression, and specifically, to a method and apparatus for compressing data in a fast and efficient manner. *See specification, page 3, lines 19-24.* Generally, the data compression method of the present invention compresses large data (such as image data used in the medical industry) by quantization of the original data to obtain quantized data followed by classifying, coding and compressing the quantized data. *Id. at page 4, lines 1-4.*

Fig. 1 shows a schematic block diagram of the data compression apparatus of the present invention. The data compression apparatus comprises several means for performing the compression method. The wavelet transform means 1 carries out wavelet transform on the original data S. *Id. at page 13, lines 21-22.* As shown in Fig. 2(a), the original data S are subjected to wavelet transform and decomposed into smaller sets of data. *Id. at page 13, lines 22-25.* The wavelet transform is repeated a desired number of times on the data. *Id. at page 14,*

lines 9-11. The data in each subband, are all called wavelet-transformed data WS. *Id. at page 14, lines 14-15*.

The classification and bit allocation means 2 determines the classification and bit allocation of the wavelet-transformed data WS. *Id. at page 14, lines 16-17*. The quantization means 3 carries out quantization of the wavelet-transformed data WS according to a TCQ (Trellis Coded Quantization), based on the bit allocation determined by the classification and bit allocation means 2. *Id. at page 15, lines 5-8*. The TCQ method is based on the TCM (Trellis Coded Modulation) developed in the field of signal communication and audio coding, and has been generated by extending the TCM method for image coding.

The classification means 4 classifies the quantized data RS (i.e. data after quantization) into three types of data: 1) data having a value representing the quantized data; 2) classified data representing a data value other than the representative value; and 3) classification information data regarding the classification. Types 1 and 2 above are classified based on their data values and type 3 is binary data representing the result of classification of the quantized data. *Id. at page 22, lines 3-6*.

The first coding means 5 is for coding the classification information data (type 3 above) using simple operations such as Huffman coding, run length coding, B1 coding, B2 coding, Wyle coding, Golomb coding, Golomb-Rice coding and binary arithmetic coding. The second coding means 6 is for coding the data having a value representing the quantized data (type 1 above) and the classified data (type 2 above). *Id. at page 24, lines 8-11*. These coding methods are efficient and enable coding at a high compression rate. *Id. at page 24, lines 11-13*. Finally, the coded

classification data is recorded as coded data F in a recording medium by the recording means 7, and the compression processing is complete. *Id. at page 26, lines 5-9.*

VI. ISSUES

1. Whether claims 1-3, 5-12, 16-18 and 22-30 are anticipated under 35 U.S.C. § 102(e) by Kolesnik et al. (U.S. Patent No. 6,249,614).[1]

2. Whether claims 4, 13 and 19 are obvious under 35 U.S.C. § 103(a) over Kolesnik et al. and Nafarich (U.S. Patent No. 6,252,994).

VII. GROUPING OF CLAIMS

For each ground of rejection, the claims stand or fall together. Accordingly the claims should be considered in two groups:

Group I: 1-3, 5-12, 16-18 and 22-30

Group II: 4, 13, and 19

VIII. ARGUMENTS

To be an "anticipation" rejection under 35 U.S.C. § 102, the reference must teach every element and limitation of the Appellant's claims. Rejections under 35 U.S.C. § 102 are proper only when the claimed subject matter is identically disclosed or described in the prior art. Moreover, to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a) the Examiner must show that the prior art references, when combined, teach or suggest all of the claim

[1] To the extent that the Examiner contends that AIPA (1999) does not apply to this application, Applicant would note that all relevant references should be deemed considered in the prosecution of this case.

limitations. *See MPEP § 2143.* As a result, in order for the Examiner to maintain a rejection under either 35 U.S.C. § 102 or 103, the references must teach all of the limitations of the claims.

Appellant respectfully submits that the references cited above by the Examiner fail to teach or suggest all of the claim limitations as set forth in the present invention. Specifically, Appellant submits that the cited references fail to teach "classifying the quantized data into data having a value representing the quantized data and at least one set of classified data representing a data value other than the representative value while obtaining classification information data regarding the classification." Essentially, the claims recite that the quantized data (i.e. data after quantization) is classified into three types of data. In other words, once data has been quantized, it is then classified into the following three data types:

1. data having a value representing the quantized data;

2. classified data representing a data value other than the representative value; and

3. classification information data regarding the classification.

The Examiner argues that the "quantization unit 110 that divides (classifies) the quantized data into two types of quantized data elements 120 and 125 ('values representing the quantized data')." *See Final Office Action, pages 2-3.* However, the Examiner acknowledges that only these "two types [of the alleged classifications of Kolesnik] are performed after quantization step." *Advisory Action, p. 2.* The other type of classification occurs before quantification (i.e. on data that has not been quantized), and thus, does not classify "quantized data" (i.e. data after quantization). The Examiner's arguments are summarized in the chart below:

Data Type in claims	**Examiner's alleged data types taught in Kolesnik**	**Is this data "quantized" (i.e. data after quantization)?**
1. data having a value representing the quantized data	Data output from Quantization Selection Unit 115 (see Fig. 1)	NO
2. classified data representing a data value other than the representative value	Quantized reference coefficients (see Fig. 1)	YES
3. classification information data regarding the classification	Quantized reference coefficients (see Fig. 1)	YES

As shown in the chart above, the first alleged classification of Kolesnik occurs before the data has been quantized. Thus, the first alleged classification does not classify quantized data because the data, at that point, has not been quantized.

Kolesnik classifies the data before quantization based on the level of correlation of the matrix of wavelet coefficients, so as to determine a quantization technique to be used. For example, the quantization selection unit 115 in Figure 1 of Kolesnik selects either of the differential 2-D quantization unit 120 or the hierarchical scalar quantization unit 125 to carry out the quantization of the data. In other words, the first data that is allegedly classified in Kolesnik is not quantized. The classification means 4 of the present invention classifies quantized data (i.e. the data after quantization) based simply on quantized data values (e.g. into zero values and non-zero values).

Since Kolesnik fails to teach classifying quantized data (data that has been previously quantized) into three types of data, Kolesnik fails to teach each and every limitation of claims 1-

3, 5-12, 16-18 and 22-30. Thus, Kolesnik fails to anticipate claims 1-3, 5-12, 16-18 and 22-30, and therefore Appellant respectfully requests that the rejection of claim 1-3, 5-12, 16-18 and 22-30 under 35 U.S.C. § 102 be reversed.

The Examiner's Advisory Action fails to add to the strength of the rejection to the extent that it 1) makes incorrect assumptions about the interoperations of the coefficient matrix and matrix coefficients and 2) demonstrates excessive double counting of elements in the cited art. As apparent from Table 1 above, the Examiner relies on the quantized reference coefficients to correspond to both the data representing a value other than the representative value and also the classification information. It is unclear how the same set of data can comprise both aspects. The Examiner identifies the coefficient matrix as quantized data (Advisory Action) but does not specifically indicate a classification of the quantized the data into data having a value representing the quantized data. No classification of the quantized data meets this and other combined aspects of the independent claim.

As discussed above, Kolesnik fails to teach each and every limitation of Appellant's claim. Since the Nafarich reference does not cure the deficient teachings of Kolesnik with respect to independent claims 1, 10 and 16, Appellant submits that Appellant submits that claims 4, 13 and 19 are patentable at least by virtue of their dependency from claims 1, 10 and 16 respectively. Therefore, Appellant respectfully requests that the rejection of claims 4, 13 and 19 under 35 U.S.C. § 103(a) be reversed.

Additionally, with regard to the Section 103 rejection, the Examiner contends that it would be obvious to combine the references due to purported analogies in quantization and

coding. For example, the Examiner contends that DCT coding results in longer zero run-lengths, thereby offering greater compression. Final Office Action, page 10. However, Nafarich only teaches that such is the case for an ordered set of coefficients based on spatial frequency. Accordingly, the purported benefit derives from a particular ordering of the coefficients. By contrast, the coefficients of Kolesnik rely on a correlation analysis to derive any meaningful result for type of quantization. Kolesnik, cols 7-8. An ordered sequence of coefficients as described by the secondary reference would defeat the statistical (random-based) coefficient processing in Kolesnik, thereby undermining a principle of operation of the reference. In particular, coefficient ordering would remove the discrepancies for high and low correlation quantization. Therefore, Applicant submits that the references may not be properly combined.

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: May 22, 2003

APPENDIX

CLAIMS 1-30 ON APPEAL:

1. A data compression method of obtaining compressed coded data by quantization of original data to obtain quantized data followed by coding and compression of the quantized data, the data compression method comprising the steps of:

classifying the quantized data into data having a value representing the quantized data and at least one set of classified data representing a data value other than the representative value while obtaining classification information data regarding the classification;

coding the classification information data according to a first coding method; and

obtaining the coded data by coding at least the classified data according to a second coding method, out of the classified data and the data having the representative value.

2. A data compression method as claimed in Claim 1, wherein the second coding method is different between the data having the representative value and each set of the classified data.

3. A data compression method as claimed in Claim 1 or 2, wherein the quantized data are obtained by carrying out wavelet transform on the original data followed by quantization thereof.

4. A data compression method as claimed in Claim 1 or 2, wherein the quantized data are obtained by carrying out DCT on the original data followed by quantization thereof.

5. A data compression method as claimed in claim 1, wherein the data having the representative value are 0 data representing the value 0 of the quantized data , and the classified data are non-zero data representing a non-zero value of the quantized data.

6. A data compression method as claimed in claim 1, wherein the first coding method is any one of Huffman coding, run length coding, B1 coding, B2 coding, Wyle coding, Golomb coding, Golomb-Rice coding, and binary arithmetic coding.

7. A data compression method as claimed in claim 1, wherein the second coding method is any one of Huffman coding, universal coding, and multi-valued arithmetic coding.

8. A data compression method as claimed in claim 1, wherein the coded data are obtained by coding the classified data according to a third coding method, out of the classification information data and/or the data having the representative value and the classified data, in the case where the amount of the coded data is larger than a predetermined information amount determined based on the original data.

9. A data compression method as claimed in claim 1, wherein a third coding method is any one of Huffman coding, arithmetic coding, and PCM coding.

10. A data compression apparatus for obtaining compressed coded data by quantization of original data to obtain quantized data followed by coding and compression of the quantized data, the data compression apparatus comprising:

classification means for classifying the quantized data into data having a representative value representing the quantized data and at least one set of classified data having a data value other than the representative value and for obtaining classification information data representing the classification;

first coding means for coding the classification information data by using a first coding method; and

second coding means for coding at least the classified data out of the data having the representative value and the classified data, according to a second coding method.

11. A data compression apparatus as claimed in Claim 10, wherein the second coding means carries out the second coding method which is different between the data having the representative value and each set of the classified data.

12. A data compression apparatus as claimed in Claim 10 or 11, further comprising wavelet transform means for obtaining the quantized data by carrying out wavelet transform on the original data followed by quantization thereof.

13. A data compression apparatus as claimed in Claim 10 or 11, further comprising DCT means for obtaining the quantized data by carrying out DCT on the original data followed by quantization thereof.

14. A data compression apparatus as claimed in claim 10, wherein the classification means classifies the quantized data by letting the data having the representative value be 0 data representing the value of 0 of the quantized data and letting the classified data be non-zero data representing a non-zero value of the quantized data.

15. A data compression apparatus as claimed in claim 10, further comprising:

judging means for judging whether or not the amount of the coded data is larger than a predetermined information amount determined based on the original data; and

third coding means for obtaining the coded data by coding at least the classified data according to a third compression method, out of the classification information data and/or the data having the representative value and the classified data, in the case where the judging means has judged the amount of the coded data to be larger than the predetermined information amount.

16. A computer-readable recording medium storing a program to cause a computer to execute a data compression method of obtaining compressed coded data by quantization of original data to obtain quantized data followed by coding and compression of the quantized data, the program comprising the procedures of:

classification of the quantized data into data having a value representing the quantized data and at least one set of classified data representing a data value other than the representative value, and acquisition of classification information data regarding the classification;

coding of the classification information data according to a first coding method; and

coding of at least the classified data out of the classified data and the data having the representative value, according to a second coding method.

17. A computer-readable recording medium as claimed in Claim 16, characterized by that the second coding method is different between the data having the representative value and each set of the classified data.

18. A computer-readable recording medium as claimed in Claim 16 or 17, the program further comprising the procedure of obtaining the quantized data by carrying out wavelet transform on the original data followed by quantization thereof.

19. A computer-readable recording medium as claimed in Claim 16 or 17, the program further comprising the procedure of obtaining the quantized data by carrying out DCT on the original data followed by quantization thereof.

20. A computer-readable recording medium as claimed in claim 16, wherein the procedure of classification is a procedure of classifying the quantized data by letting the data

having the representative value be 0 data representing the value 0 of the quantized data, and by letting the classified data be non-zero data representing a non-zero value of the quantized data.

21. A computer-readable recording medium as claimed in claim 16, the program further including the procedures of:

judgment as to whether or not the amount of the coded data is larger than a predetermined information amount determined based on the original data; and

acquisition of the coded data by coding at least the classified data according to a third compression method out of the classification information data and/or the data having the representative value and the classified data, in the case where the amount of the coded data has been judged to be larger than the predetermined information amount.

22. The data compression method of claim 1, wherein said classification information data comprises a comparatively small information amount.

23. The data compression method of claim 22, wherein said classification information data comprises 3-valued data.

24. The data compression method of claim 22, wherein said classification information data comprises binary data.

25. The data compression apparatus of claim 10, wherein said classification information data comprises a comparatively small information amount.

26. The data compression apparatus of claim 25, wherein said classification information data comprises 3-valued data.

27. The data compression apparatus of claim 25, wherein said classification information data comprises binary data.

28. The computer-readable recording medium of claim 16, wherein said classification information data comprises a comparatively small information amount.

29. The computer-readable recording medium of claim 28, wherein said classification information data comprises 3-valued data.

30. The computer-readable recording medium of claim 28, wherein said classification information data comprises binary data.